

REMARKS

Claims 1-34 and 36-66 are pending, claims 1, 2, 5-14, and 48-66 are withdrawn, and claims 3, 4, 15, and 36-47 stand rejected.

(1) Claims 3 and 15 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by “Hiroyuki” (JP 09-241405).

The Examiner cites Hiroyuki as teaching a method meeting the terms of claims 3 and 15, which includes releasing a substance from an article using the external force of ultraviolet light, where the substance comprises a photoactive substance and is emitted towards a substrate surface in order to form a solid surface which is rich in hydrophilic nature.

Applicants respectfully traverse for at least the following reasons.

In the Office Action of November 10, 2009, the Examiner acknowledges Applicants’ argument that Hiroyuki does not disclose step (3) of claim 3, where the surface of the article, which was once hydrophobilized in step (2), is hydrophilized by application of energy.

However, the Examiner asserts that such limitation is not recited in claim 3 and moreover, the claim is not limited to two-step hydrophobilization of the article surface.

Applicants disagree as discussed below.

Applicants respectfully submit that it is inherent to the language of claim 3 that the steps must be performed in order, because the first step recites “releasing a substance,” whereas the second step recites “bringing the released substance...into contact with the article surface to adhere”. From the past tense of the word “released”, it should be clear that step (2) must be performed after step (1). Further, the third step recites “applying energy to the article in which the substance...was adhered.” From the past tense of the word “adhered”, it should be clear that

step (3) can only take place after step (2), where the released substance has already been brought into contact with the article surface to adhere. Therefore, Applicants respectfully submit that the language of claim 3 indicates that the steps of claim 3 must be performed in order.

Next, by way of explanation, Applicants would like to discuss the differences between the presently claimed invention and the disclosure of Hiroyuki by way of an illustrative discussion of claim 3 in the context of an embodiment of the invention as discussed in the specification. See present claim 3 and page 21, line 23 - page 24, line 11 of the present specification.

Referring to Fig. 3, in an embodiment of the presently claimed invention, there may be a pretreatment step corresponding to Fig. 3(a), wherein a glass article 1 and a surface layer 7 has titanium oxide 6 formed on its surface. In this pretreatment step, the surface may be irradiated by ultraviolet rays to become hydrophilic.

Claim 3 recites “(1) a step for releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the article surface, where a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water.”

As an illustration of step (1), referring to Fig. 3(b), the illustration depicts the step of releasing a substance for increasing a contact angle of water 3, which in this particular embodiment is organosilane, having a larger contact angle of water than that of the surface article 7, which in this embodiment is titanium covered glass, from a material for controlling a contact angle of water 2, which in this particular embodiment is polydimethylsiloxane (PDMS), which contains the substance for increasing a contact angle of water 3.

Step 2 of claim 3 recites “a step for increasing the contact angle of water of the article surface by bringing the released substance for increasing a contact angle of water into contact with the article surface to adhere the substance to the article surface”.

As an illustration of this step, still referring to Fig. 3(b), in this particular embodiment, a step for increasing the contact angle of water of the article surface takes place, where the released substance 3, which in this embodiment is an organosilane, is brought into contact with the surface of the article 7 for increasing a contact angle of water. The released substance for increasing contact angle is adhered to the article surface 7 to form a hydrophobic adhesion layer 4, to increase the contact angle of water.

Next, claim 3 recites “a step for decreasing the contact angle of water on the article surface by applying energy to the article to which the substance for increasing a contact angle of water was adhered to release the substance for increasing a contact angle from the article”.

Referring to Fig. 3(d), the water contact angle of the article surface is decreased by applying energy, which in this particular embodiment is ultraviolet rays, to the article to which the substance for increasing a contact angle of water 4 was adhered. In this particular embodiment, the substance for of increasing water angle is released by photolysis of the siloxane to decrease the water contact angle of the article surface.

In contrast, Hiroyuki does not disclose bringing a released substance into contact with the article surface to adhere to the article, as recited by claim 3. Rather, Hiroyuki places a photoactive substance (such as an azide compound, an azo compound, a carbonyl compound, an acid anhydride compound, etc.) on the surface of an article and then irradiates the photoactive substance on the surface of the article to release the active species on that same surface (i.e., “the

solid layer (film) consists of a mixture of a matrix substance and a photoactive substance will be formed on a substrate”). See paragraphs [0008], [0009] and [0005] of Hiroyuki. Thus, there is no “bringing” of the “released substance” of Hiroyuki into contact with the article surface to adhere, as recited in claim 3, because the matrix and photoactive substance of Hiroyuki are already in contact with the article surface.

Further, there is no subsequent step of “applying energy to the article” after the “bringing the released substance...into contact with the article.” Rather, Hiroyuki applies energy to the matrix substance before bringing the photoactive substance into contact with the article surface, because Hiroyuki must apply energy in order to produce the photoactive substance. Therefore, Hiroyuki does not disclose applying energy to the article after bring the released substance into contact with the article.

In addition, the second step of claim 3 recites “increasing the contact angle of water on the article surface”, while the third step of claim 3 recites “decreasing the contact angle of water on the article surface by applying energy to the article”.

In contrast, Hiroyuki may disclose a method for decreasing the water contact angle if the active species contains an oxygen and nitrogen atom. See paragraph [0005] of Hiroyuki. Further, Hiroyuki may also disclose a method for increasing the water contact angle if the active species contains a fluorine atom. However, Hiroyuki does not disclose modifying the article surface with one active ingredient (“a substance for increasing water contact angle”) to increase the water contact angle, and then disclose modifying the same surface by applying active energy in a subsequent step to decrease the water contact angle. In contrast, Hiroyuki discloses modifying a substrate with a single photoactive substance and upon irradiation such that the

surface will be either hydrophilic or hydrophobic based on the choice of the active species. See paragraph [0011] of Hiroyuki.

Claim 15 is dependent upon claim 3 directly.

Therefore, Applicants respectfully submit that claims 3 and 15 are not anticipated by Hiroyuki, because Hiroyuki does not disclose all of the limitations of claims 3 and 15.

Reconsideration and withdrawal of the § 102 rejection based on Hiroyuki are respectfully requested.

(2) Claims 3, 4, 15, 36-37 and 46-47 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over “Hayakawa” (U.S. Patent Application Publication 2002/0016250).

(3) Claims 38-45 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Hayakawa as applied above, and further in view of “Huang ‘758” (U.S. Patent No. 6,352,758) as supported by “Huang ‘182” (U.S. Patent 5,939,182).

Hayakawa was cited as disclosing a process of decreasing the contact angle of water during the formation of an antifogging mirror and/or self cleaning surface, including the step of coating a substrate with a photocatalytic coating, such as titania (TiO₂), which is considered to be hydrophobic surface and then subjecting the coated surface to UV light to change its surface characteristics, such that the surface becomes super-hydrophilic on a glass substrate. See paragraphs [0081], [0034], [0078-0079] and [0086] of Hayakawa.

The Examiner acknowledges that Hayakawa does not explicitly teach that “a substance is released and the released substance adhered to the article while increasing the contact angle with

water.” However, the Examiner asserts that it would have been “obvious to release a substance while subjecting the article with UV light for providing the increased contact angle.”

In the Response to Argument section, the Examiner acknowledges Applicants’ argument that the cutting layer of Hayakawa comprises a titanium oxide that is formed by applying a photocatalytic coating composition and that this forming step is different from that of the instant process steps (1) and (2). However, the Examiner asserts that this argument is not commensurate with the claimed limitation as the steps 1 and 2 (presumably steps 1 and 2 in claim 3) because Hayakawa teaches that the material, such as titanium oxide, to be released in the medium is same as the instant invention and such material undergoes the application of energy for changing the surface characteristics such as hydrophobic to hydrophilic. Therefore, the Examiner concludes that Hawakawa discloses the limitation of decreasing the water contact angle on the article surface by applying energy and release of the substance by application of energy that is responsible for increasing a contact angle.

Applicants respectfully traverse for at least the following reasons.

In the last response, the Examiner states that Hayakawa teaches the material such as titanium oxide to be released in the medium is same as the instant invention and such material undergoes the application of energy for changing the surface characteristics such as hydrophobic to hydrophilic and therefore, reads on the limitation of decreasing the water contact angle on the article surface by applying energy and the substance is released by the application of energy that is responsible for increasing a contact angle.

Applicants respectfully disagree.

First, the Examiner seems to be implying that the substance for increasing a contact angle of water is titanium oxide in the presently claimed invention. However, the substance for increasing the contact angle of water is not titanium oxide in the presently claimed invention. Rather, at most, titanium oxide would be part of the article surface of step (3) of claim 3. See the above discussion for the § 102 rejection and page 21, lines 23 - page 23, line 11 of the present specification.

Present claim 3 recites “(1) the step for releasing a substance for increasing a contact angle of water which provides a surface having a contact angle of water larger than that of the article surface, from a material for controlling a contact angle of water which contains the substance for increasing a contact angle of water.”

In contrast, Hayakawa discloses a method of rendering a surface hydrophilic, which comprises coating a substrate with a photocatalytic titanium coating, and then exposing the photocatalytic coating to UV rays. While Hayakawa may disclose providing an article having an article surface comprised of a substance being capable of decreasing a contact angle of water by application of energy (i.e., oxidizing the titanium oxide), Hayakawa does not disclose step (1) of claim 3, because the titanium oxide is not “released from” the material for controlling a contact angle of water which contains the substance for increasing a contact angle of water. Rather, the titanium is oxidized into titanium oxide, which is different from being released from a material as recited in present claim 3.

Further, present claim 3 recites “(2) a step for increasing the contact angle of water of the article surface by bringing the released substance for increasing a contact angle of water into contact with the article surface to adhere the substance to the article surface”.

However, in Hayakawa, there no step of “bringing” titanium oxide into contact with the article surface after step (1), because the titanium is converted into titanium oxide on the surface of the article. In other words, the titanium oxide is not brought into contact with the article surface, rather the titanium oxide was always in contact (since formation) with the article surface. Therefore, Hayakawa does not teach the recitations of step (2) of claim 3.

Lastly, present claim 3 recites that “the substance for increasing water contact angle of water was adhered to release the substance for increasing a contact angle from the article.” However, Hayakawa does not “release” the substance for increasing the contact angle (by the Examiner’s analogy titanium) from the article surface. Rather, the titanium layer is merely converted into titanium oxide, which remains on the surface of the article.

In view of the above, Applicants respectfully submit that claim 3 and claims dependent thereon are not rendered obvious by Hayakawa.

Claims 4, 15 and 36-47 depend from claim 3, either directly or indirectly.

The Huang references do not make up for the deficiencies of Hayakawa.

In view of the above, Applicants respectfully submit that the Examiner has not established a *prima face* case of obviousness.

Therefore, reconsideration and withdrawal of the § 103 rejections are respectfully requested.

(4) Claims 3, 4, 15 and 36-47 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 1-16 of copending Application No. 10/574,200.

DAIKIN INDUSTRIES, LTD.; and NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY, the common assignees of 100% interest in the present application and U.S. Application No. 10/574,200, file herewith a Terminal Disclaimer, disclaimint the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending reference Application No. 10/574,200, to thereby obviate the present provisional obviousness-type double patenting rejection.

Withdrawal of the provisional rejection is earnestly solicited.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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